

The 12 GHz 5G Opportunity:

*Accelerating Next-Generation
Broadband Deployment with 500 MHz
of Mid-Band Spectrum at 12.2-12.7GHz*

October 2, 2019

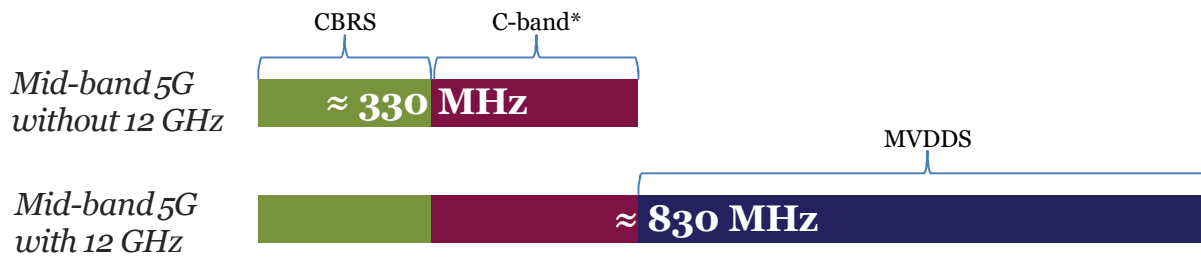


The 12 GHz opportunity— 500 MHz of contiguous mid-band spectrum

Freeing mid-band spectrum is essential to advancing 5G deployment in the United States.

Mid-band spectrum currently targeted for 5G deployment is necessary but not sufficient.

Granting flexibility to already existing terrestrial geographic-area licenses at **12.2-12.7 GHz** would **more than double the nationwide mid-band spectrum newly available** for 5G mobile broadband deployment and offer the **only mid-band segment with 100+ megahertz channels.**



** Assuming the FCC adopts the C-Band Alliance proposal to make 180 MHz available for flexible use.*



There is no other spectrum between 6 GHz and 24 GHz that can readily support terrestrial 5G mobile services

The 12 GHz Basics



Unique set of already existing licensees at 12 GHz awaiting modification.



The 12 GHz band is allocated internationally for multiple uses, including **mobile (primary)**.



The FCC exhaustively licensed the 12.2-12.7 GHz band through **competitive bidding in 2004 and 2005**.



The U.S. **terrestrial fixed licenses are co-primary** with (1) DBS and (2) Non-Geostationary Orbit Fixed Satellite Service (NGSO FSS).



An **April 2016 petition** sought license modifications under Section 316 to permit terrestrial mobile use; the petition received public notice and comment, but no further action has occurred.

A Golden Opportunity for Mid-Band Spectrum

The combination of favorable propagation characteristics of the mid-band frequencies (as compared to bands above 24 GHz) and the opportunity for additional channel bandwidth (as compared to bands below 3.7 GHz), could make many of these mid-band frequencies well-suited for next-generation wireless services.

– *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 GHz and 24 GHz, Notice of Inquiry (Aug. 3, 2017)*

RS Access Background



MDS America (MDSA)* acquired

- 60 licenses in Auction 53 (2004)
- 20 licenses in Auction 63 (2005)



RS Access, a newly formed company backed by MSD Capital, entered into a spectrum lease and related asset purchase agreement with MDSA in 2018.



RS Access has deployed 300 transmit/receive links constructed for Wi-Fi extension, video, and first-responder services at various academic, commercial, veterans' service organizations and community anchor institutions.

** No relation to MSD Capital*



RS Access has made meaningful MVDDS investments and deployments . . .

- Delivering a variety of data- intensive applications
- Operating within current regulatory constraints
- With a diverse set of users, including rural and underserved communities

MSD Capital Background



Private investment firm established in 1998



Capital manager for Michael Dell, his family and affiliated charitable foundation assets



Investments across the globe in

- Equity (public & private)
- Debt
- Real estate
- Telecommunications
 - Numerous spectrum-related investments
 - Formed OTA Broadcasting (2011)
 - Acquired 20+ TV stations
 - Participated in Auction 1001 (2017)



MSD Capital formed RS Access, LLC in partnership with V. Noah Campbell in 2018



**MSD Capital and
MSD Partners manage
approximately
\$16 billion and
employ more than
115 people***

** As of April 30, 2019.*

Forward-thinking spectrum policy, modern infrastructure policy, and market-based network regulation form the heart of our strategy for realizing the promise of the 5G future.

– Chairman Pai

The 12 GHz band can help deliver the 5G future – FAST



The 12 GHz mid-band spectrum can offer both capacity and coverage for 5G, and channel bonding this spectrum with CBRS, C-Band and other mid-band frequencies can rapidly enhance planned 5G deployments.













RS Access is a new entrant who supports bringing new 5G spectrum to market.

- RS Access has aggressively invested in deploying fixed, point-to-multipoint distribution systems throughout its footprint.
 - The rules governing the 12.2-12.7 GHz band have not been revisited since 2002 and urgently require a fresh look given the national priority on U.S. technological leadership in 5G.
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Permitting two-way, mobile uses in the 12 GHz band will deliver vast new mid-band spectrum resources to market.

The 12 GHz solution: A unique band at a pivotal moment for 5G

- | | |
|---|---|
|  <hr/> 500 MHz of contiguous mid-band spectrum available for 100+ MHz channelizations for 5G <hr/> |  <hr/> MVDDS licensees already possess terrestrial rights awarded through competitive bidding <hr/> |
|  <hr/> Exhaustive geographic licensing <hr/> |  <hr/> Straightforward license modifications <hr/> |
|  <hr/> Significant propagation advantages over mmW frequencies <hr/> |  <hr/> Few stakeholders <hr/> |
|  <hr/> Little or no disruption to existing operations <hr/> |  <hr/> Existing global mobile allocation and potential for international harmonization* <hr/> |
|  <hr/> No federal encumbrances <hr/> |  <hr/> Channel bonding with other mid-band spectrum (e.g., CBRS and C-band) can support and extend 5G network capacity <hr/> |

* 12.2-12.7 GHz is co-primary mobile in Regions 2 and 3. The 12.2-12.5 GHz band is co-primary mobile in Region 1 and regionally in Region 1 at 12.5-12.7

Now is the time to more than double the amount of mid-band spectrum available for 5G investment and innovation



The problem?

- Outdated rules (2002)
- Low power limits (1/10th PCS *handset* power)
- Outdated service limitations (fixed, one-way data)



The solution?

- Smarter, faster coordination
- Up-to-date operating rules and policies
- Flexible-use licenses for two-way, mobile broadband



What's needed now

- A timely notice and comment rulemaking proceeding to decide the future of the 12 GHz band
 - Does MVDDS offer an opportunity to accelerate access to mid-band spectrum for 5G?
 - Can AI accelerate and simplify inter-service coordination?
 - Does a flexible use licensing scheme ensure that MVDDS licenses are put to their highest valued use? What size license areas would best support 5G operations?
 - How soon would flexibility need to be received to allow for seamless channel bonding between the 12.2-12.7 GHz band and other 5G bands, such as the CBRS and C Band spectrum?

The FCC can expand 12 GHz flexibility and preserve stakeholders' interests

RS Access takes seriously the rights held by DBS licensees and the needs of their customers as well as the desirability of NGSO FSS platforms.



DBS can continue to operate

- DISH has explained that its DBS systems and two-way, mobile broadband MVDDS can coexist without impairing DBS operations.
- While AT&T has taken a more skeptical view of sharing in prior filings, technical solutions are readily available to identify and protect 12 GHz DBS customers from harmful interference.
 - High-powered MVDDS transmitters (under waiver) in the Albuquerque-Santa Fe DMA have operated without complaint for several years.
 - Small cells, network design, power control and other features offer new options for coexistence.
- DBS operates using Ku-band (12 to 18 GHz) and K-/Ka-band (18 to 40 GHz) frequencies; Ka-band migration further reduces interference concerns.



NGSO FSS can continue to operate

- No NGSO FSS licensees are operational and many may never be*
- NGSO FSS licensees have roughly five gigahertz of spectrum licensed to them
 - OneWeb – 5.4 GHz
 - SpaceX – 5.55 GHz
 - Theia – 8.7 GHz
 - Karousel – 6.5 GHz
 - Kepler – 4.75 GHz
 - Space Norway – 5 GHz
- NGSO FSS licensees have been placed on notice that their authorizations at 12.2-12.7 GHz are subject to modification by FCC rules and policies.

* The term “licensees” is used here broadly to include foreign-licensed NGSO FSS systems that have received market-access grants from the FCC.

National priorities and industry developments have accelerated the pace of change

- Multi-element, dynamic beam-forming antennas, channel bonding and other technologies have now made higher frequency communications technically and economically feasible.
- Spectrum in the 12.2-12.7 GHz band can now support small cells, wide-area networks, and next-generation services.
- AT&T is focused on “thin-client” distribution of video, not legacy DBS.
- Video distribution has increasingly moved to over-the-top delivery, and demand for bundled and standalone OTT video has exploded.
- The 12.2-12.7 GHz band needs a fresh look now.



We've launched our last satellite.

– AT&T

We're calling it a thin client solution, but it's a satellite replacement product. And it is broadband-driven. And the lion's share of our video over the next couple of years will be this thin client.

– AT&T

Summary: 12 GHz offers a one-of-a-kind resource to accelerate 5G investment and deployment

The 12.2-12.7 GHz band offers 500 MHz of mid-band spectrum that is ideal for 5G operations.

MVDDS licensees have exhaustively licensed terrestrial rights acquired through competitive bidding that enable streamlined reform under Section 316 of the Communications Act.

Reform is achievable, not complicated, serves an enormous public interest benefit, and promotes FCC goals.

Mobile broadband in 12.2-12.7GHz is not an either-or decision among terrestrial, DBS and NGSO FSS licensees.



Inaction is a decision to forego a vital new 5G mid-band spectrum resource

Appendix 1: Historical MVDDS Timeline

Mid-1990s	1999	2002	2004-2005
MDSi Hypercable developed an MVDDS technology. A competitor, Northpoint Technology, Ltd., developed its own MVDDS technology.	Northpoint filed in a satellite processing round to secure rights to 12 GHz band spectrum.	Following a technical study, the FCC adopted service rules for co-primary, one-way, point-to-multipoint operations at 12.2-12.7 GHz called MVDDS.	The FCC auctioned terrestrial MVDDS geographic-area licenses in January 2004 (Auction 53) and in December 2005 (Auction 63).

Appendix 2: International and Domestic Table of Frequency Allocations

Table of Frequency Allocations			12.2-15.4 GHz (SHF)		Page 49
International Table			United States Table		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Federal Table	Non-Federal Table	
(See previous page)	12.2-12.7 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 5.492	12.2-12.5 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile BROADCASTING 5.484A 5.487	12.2-12.75	12.2-12.7 FIXED BROADCASTING-SATELLITE	Satellite Communications (25) Fixed Microwave (101)
12.5-12.75 FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space)	5.487A 5.488 5.490 12.7-12.75 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE except aeronautical mobile	12.5-12.75 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A MOBILE except aeronautical mobile BROADCASTING-SATELLITE 5.493		5.487A 5.488 5.490 12.7-12.75 FIXED NG118 FIXED-SATELLITE (Earth-to-space) MOBILE	TV Broadcast Auxiliary (74F) Cable TV Relay (78) Fixed Microwave (101)
5.494 5.495 5.496 12.75-13.25			12.75-13.25	12.75-13.25	Cable

Appendix 3: Overview of Current Stakeholders in 12.2-12.7 GHz

	DBS	MVDDS	NGSO FSS
Operators	DirecTV (AT&T) DISH	RS Access DISH Network Others	While there are no current commercial operations, OneWeb and SpaceX, among others, have stated they intend to deploy in future.
Status	Supports DBS, along with 17/24 GHz BSS “reverse” band, which is allocated for the provision of video programming, as well as frequency bands allocated for Ka-band GSO FSS (18.3-18.8/19.7-20.2 GHz downlink; 28.35-28.6/29.25-30.0 GHz uplink).	Licensees initially acquired spectrum at auction and have since used it to deploy P2MP terrestrial services. They uniformly support reform.	NGSO FSS licensees have been placed on notice that their operations remain contingent on the outcome of potential modifications to the scope of MVDDS operations in the 12.2-12.7 GHz band.